MORTAR BVI MORTAR BVI MORTAR BVI MORTAR BVI

What is MORTAR BVI?

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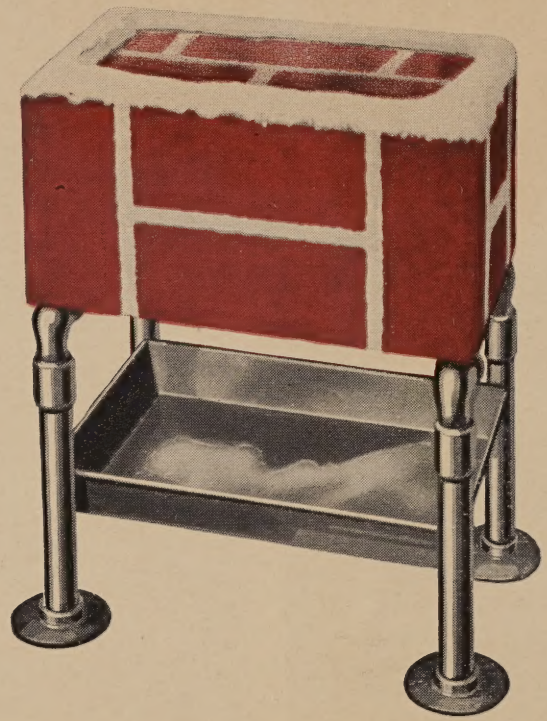

ILLUSTRATION

Eight-inch brick wall with a dam around the top filled with water to determine how much water will pass through per minute with different kinds of mortar and brick.

What do you think of a Mortar that will do this

THE NATIONAL LIME ASSOCIATION
THE PORTLAND CEMENT ASSOCIATION
THE AMERICAN FACE BRICK ASSOCIATION
A GROUP OF MASONRY CEMENT MANUFACTURERS

THE above are the four organizations which financed an investigation at the National Bureau of Standards for three years, costing about $20,000, in which 50 different kinds of mortars—from straight lime and sand to straight Portland cement and sand and all intermediate mixes, also 12 representative masonry cements—were tested, to determine what mortar will produce the best and most durable bond between brick and mortar. HY-TEST Masonry Cement was included in these tests.

The results have been published in U. S. Bureau of Standards Journal of Research Paper No. 683 and by the American Society for Testing Materials.

L. A. Palmer, recognized as an eminent authority on brickwork, now with the Research Department of the National Lime Association, was in charge of these tests and together with his assistants was paid by the four above-mentioned organizations so that the tests would be conducted with impartiality toward all materials.

Among the numerous tests conducted, Mr. Palmer built 240 eight-inch brick walls, using the mortars and brick mentioned below—then built small dams around the face of the brick walls (see illustration above) which were then filled with water and the amount of water passing through each wall per minute was measured.

It is definitely established that most water enters a wall "between the brick and the mortar," and this test was made to determine "how complete a bond" was made with each mortar and brick. Naturally, less water will penetrate where the adhesion is "most complete."

Among the mortars used were the following:

1 Part HY-TEST Masonry Cement with 3 Parts Sand
(In the Bureau of Standards investigation known as Mortar B VI)

1 Part Portland Cement, 2 Parts Slaked Lime Putty and 9 Parts Sand
(In the Bureau of Standards investigation known as Mortar XVb)

1 Part Portland Cement, 3 Parts Slaked Lime Putty and 12 Parts Sand
(In the Bureau of Standards investigation known as Mortar XRc)

1 Part Portland Cement, 1 Part Slaked Lime Putty and 6 Parts Sand
(In the Bureau of Standards investigation known as Mortar XRa)

1 Part Soaked Hydrated Lime Putty with 3 Parts Sand
(In the Bureau of Standards investigation known as Mortar C II)

1 Part Portland Cement, 3 Parts Sand with 15% Hydrated Lime
(In the Bureau of Standards investigation known as Mortar XTd)

The following types of brick were used:

Brick No. 1—Dry-press clay, fast absorbing, smooth.

Brick No. 2—Shale, moderate speed of absorption, very rough.

Brick No. 3—Shale, slow speed of absorption, moderately rough.

Brick No. 5—Clay, very slow absorption, smooth and glassy.

Brick No. 6—Clay, fairly fast absorption, very smooth.

This Simple Table Tells the Story

Below is Table III exactly as it appears in American Society for Testing Materials Reprint entitled "PERMEABILITY TESTS ON EIGHT-INCH BRICK WALLS," showing the average leakage per minute through the walls with various mortars.

TABLE III.—PERMEABILITY OF TEST WALLETTES. (ALL BRICK AND MORTAR COMBINATIONS.)

Each value is the average maximum rate recorded to the nearest half milliliter of water transmitted through 3 specimens.

Mortar	Flow After 1 Minute Suction on Standard Porous Base,[a] per cent	Brick No. 1		Brick No. 2		Brick No. 3	Brick No. 5	Brick No. 6		Average for Each Mortar, ml. per min.
		Set Wet, ml. per min.	Set Dry, ml. per min.	Set Wet, ml. per min.	Set Dry, ml. per min.	Set Dry, ml. per min.	Set Dry, ml. per min.	Partially Wetted When Set, ml. per min.	Set Dry, ml. per min.	
B I	74	2.5	77.5	39.0	217.0	24.0	0.0	322.0	185.0	108.5
B XI	87	0.0	95.0	44.0	60.5	48.5	4.0	304.0	163.0	90.0
B VI	91	7.5	94.0	15.0	60.5	21.0	0.0	205.0	223.0	83.2
XRc	91	5.5	128.0	26.5	149.0	23.0	0.0	131.0	201.0	83.0
XVb	93	40.0	98.0	40.0	132.0	6.0	0.0	155.0	400.0	109.0
XRa	75	177.0	386.0	43.0	90.0	27.0	0.0	259.0	241.0	153.0
C II	68	6.0	178.0	36.0	178.0	61.0	1.0	470.0	575.0	188.0
B III	41	10.0	317.0	97.0	192.0	33.5	0.0	537.0	710.0	237.0
B IV	48	13.0	626.0	138.0	150.0	5.5	0.0	976.0	759.0	333.5
XTd	54	7.5	402.0	226.0	226.0	165.0	0.0	608.0	854.0	311.0
Average for each brick		27.0	240.0	70.5	146.0	41.5	0.5	397.0	438.0	

In the American Society for Testing Materials Reprint Mr. Palmer makes the following comments:

"Poorest results were obtained with brick No. 6. Specimens of this brick were usually badly cracked and it is believed that the poor results in this case were in a large measure due to this condition."

So let us eliminate cracked brick No. 6 and note what happens in revised Table III.

TABLE III WITH CRACKED BRICK NO. 6 ELIMINATED

Mortar	Brick No. 1 Set wet ml. per min.	Brick No. 1 Set dry ml. per min.	Brick No. 2 Set wet ml. per min.	Brick No. 2 Set dry ml. per min.	Brick No. 3 Set dry ml. per min.	Brick No. 5 Set dry ml. per min.	Average for each mortar, ml. per min.
B VI	7.5	94.0	15.0	60.5	21.0	0.0	33.0
B XI	0.0	95.0	44.0	60.5	48.5	4.0	42.0
XVb	40.0	98.0	40.0	132.0	6.0	0.0	52.7
XRc	5.5	128.0	26.5	149.0	23.0	0.0	55.3
B I	2.5	77.5	39.0	217.0	24.0	0.0	60.0
C II	6.0	178.0	36.0	178.0	61.0	1.0	76.7
B III	10.0	317.0	97.0	192.0	33.5	0.0	108.3
XRa	177.0	386.0	43.0	90.0	27.0	0.0	120.5
B IV	13.0	626.0	138.0	150.0	5.5	0.0	155.4
XTd	7.5	402.0	226.0	226.0	165.0	0.0	171.1
Average for each brick	27.0	240.0	70.5	146.0	41.5	0.5	

Omitting "cracked" brick No. 6, walls laid up with Mortar BVI (HY-TEST Masonry Cement) showed the lowest water penetration, 33 ml. per minute.

Mortar XVb showed 52.7 ml. per minute or 60% more water penetration.
Mortar XRc showed 55.3 ml. per minute or 67% more water penetration.
Mortar CII showed 76.7 ml. per minute or 132% more water penetration.
Mortar XRa showed 120.5 ml. per minute or 265% more water penetration.
Mortar XTd showed 171.1 ml. per minute or 418% more water penetration.

The "averages" are important because of the extremes in the speed of absorption of brick. With the exception of highly vitreous brick, a single load will contain brick of high, low and intermediate absorption, depending from what part of the kiln the brick was taken. The "average" leakage noted in Table III represents what a particular mortar will do with "an average range" of brick.

A standing offer of Five Hundred Dollars will be given to any charity if it is proven that the tables in this folder are not in accordance with the tables published in U. S. Research Paper No. 683 or American Society for Testing Materials Reprint.

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What you should know about HY-TEST CEMENT

PIONEER MASONRY CEMENT IN THE EAST — THIRTEEN YEARS SUCCESSFUL USE

N. Y. C. R. R. OFFICE BUILDING, NEW YORK
The New York Central Railroad's "own child"
Architects, Warren & Wetmore, N. Y.
Contractors, James Stewart & Co., N. Y.
Approximately 20,000 bbls. of HY-TEST Mason's Cement used

DEPARTMENT OF COMMERCE BUILDING, WASHINGTON, D. C.
Architects, York & Sawyer, N. Y. *Associate Architects,* U. S. Treasury Department *Contractors,* Consolidated Engineering Co., Baltimore, Md.
This is the largest office building in the world
Approximately 30,000 bbls. of HY-TEST Cement used

RADIO CORPORATION OF AMERICA, NEW YORK
Architects, Cross & Cross, New York
Mason Contractors, George Colon & Co., N. Y.
Approximately 8,000 bbls. of HY-TEST Cement used

What HY-TEST will Do

HY-TEST is the trade name of a waterproofed masonry cement used for producing a plastic, smooth-working mortar for laying brick, stone, tile, terra cotta and other masonry units. It combines the smoothness in lime with the strength in Portland cement and therefore takes the place of such mixtures. One material on the job instead of two.

HY-TEST comes on the job ready to be used. Just HY-TEST, sand and water.

No additions of lime or waterproofing compounds necessary with HY-TEST. No slaking or soaking to worry about.

With HY-TEST cement one laborer can keep as many as 25 bricklayers supplied with mortar continuously.

Each bag of HY-TEST contains a cubic foot of masonry cement. Add 3 cubic feet of clean graded sand to each bag. Then add the water. That's all.

HY-TEST mortar sticks to the brick. Its fattiness allows you to fill all the joints with ease.

HY-TEST mortar hangs together and does not slop down the face of the wall. It is rarely ever necessary to wash down walls laid with HY-TEST mortar.

HY-TEST is the Masonry Cement designated in the Tests conducted at the Bureau of Standards as Mortar No. B VI

Mortar No. BVI is ranked as one of the three mortars that made the most complete bond between brick and mortar of any of the fifty mortars tested.

Mortar No. BVI is given a higher rating for bond durability under weather exposure than any combination of Portland cement and lime.

Mortar No. BVI is ranked among those mortars that have the lowest volume change (shrinkage) subsequent to hardening.

Mortar No. BVI is ranked among the five mortars of the fifty tested where the bond between brick and mortar was stronger than the mortar. (See U. S. Research Paper No. 683, page 642.)

MORTAR NO. B VI

As used in the investigation conducted at the Bureau of Standards

Manufactured by

HY-TEST CEMENT CO.

1616 WALNUT STREET, PHILADELPHIA, PENNA.

Do Water-Tight Walls mean anything to You?

You can't keep water out if there is no bond between the brick and the mortar.

The real function of a good mortar is to bind the brick together so extensively (not in spots) that very little, if any, water will get through.

The investigation at the Bureau of Standards described on the other side of this page was made for your benefit. Don't take our word. Don't take anyone's word. For five cents you can secure a copy of U. S. Research Paper No. 683 from the Superintendent of Documents, Washington, D. C. It tells you unbiased the performance of 50 different kinds of mortars including HY-TEST Masonry Cement. We will send you a copy gratis if you will write us.

Avoid a mortar that has high volume change (shrinkage) after hardening.

Investigate the adhesion properties of a mortar BEFORE you use it or you will regret it AFTER you use it.

Investigate from unbiased sources BEFORE you pick your mortar. Send for U. S. Research Paper No. 683, or American Society for Testing Materials Reprint entitled "PERMEABILITY TESTS ON EIGHT-INCH BRICK WALLS" *by L. A. Palmer and D. A. Parsons.*